

Application No.: 10/701201

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Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-42. Cancelled

43. (New) An illumination unit, comprising:

a first curved reflector comprising a first reflecting surface that defines a first reflector axis; and

a first light emitting diode (LED) positioned to emit light generally along an LED axis non-parallel to the first reflector axis, light from the first LED being reflectingly converged by the first reflecting surface towards a first target focus ;

wherein a first plane formed by the first reflector axis and the LED axis intersects the reflecting surface at an intersection region, the intersection region of the first reflecting surface extending closer towards the first focus than regions of the first reflecting surface outside the intersecting region.

44. (New) A unit as recited in claim 43, wherein the first LED axis forms an angle to the first reflector axis of θ , where $45^\circ \leq \theta \leq 90^\circ$, where θ is the minimum angle between the LED axis and the first reflector axis.

45. (New) A unit as recited in claim 44, wherein $60^\circ \leq \theta \leq 90^\circ$.

46. (New) A unit as recited in claim 44, wherein the θ is approximately 90° .

47. (New) A unit as recited in claim 43, wherein the first reflecting surface conforms to a first surface of revolution about the first reflector axis.

48. (New) A unit as recited in claim 47, wherein the first reflecting surface conforms to an ellipsoid, the light emitting area of the first LED being positioned substantially at a first

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focus of the ellipsoid, the first target focus being positioned approximately at the second focus of the ellipsoid.

49. (New) A unit as recited in claim 43, wherein the first reflector is formed of a transmitting medium with the reflecting surface defined on an outside surface of the transmitting medium, the transmitting medium being positioned between the first LED and the reflecting surface of the first reflector.

50. (New) A unit as recited in claim 49, wherein the first reflector has a first exit aperture, the converging light from the first LED exiting through the first exit aperture, the transmitting medium having a substantially flat surface at the first exit aperture.

51. (New) A unit as recited in claim 49, wherein the first reflector has a first exit aperture, the converging light from the first LED exiting through the first exit aperture, the transmitting medium having a faceted surface at the first exit aperture.

52. (New) A unit as recited in claim 49, wherein the first reflector has a first exit aperture, the converging light from the first LED exiting through the first exit aperture, the transmitting medium having a curved surface at the first exit aperture.

53. (New) A unit as recited in claim 49, wherein the transmitting medium has a concave surface forming a concavity for receiving the first LED, at least part of a lens of the first LED being located in the concavity.

54. (New) A unit as recited in claim 53, further comprising an index matching material disposed between the first LED and the concave surface.

55. (New) A unit as recited in claim 53, wherein the first LED is optically cemented to the concave surface.

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56. (New) A unit as recited in claim 43, wherein the first reflective surface is supported by a reflector support medium, the reflecting surface being disposed between the first LED and the reflector support medium.

57. (New) A unit as recited in claim 43, further comprising at least a second reflector comprising a second reflecting surface that defines a second reflector axis non-parallel to the first reflector axis, and a second LED positioned to emit light generally non-parallel to the second reflector axis, light from the second LED being reflectingly converged by the second reflecting surface.

58. (New) A unit as recited in claim 57, wherein the first and second reflector axes intersect approximately at the first target focus.

59. (New) An illumination unit, comprising:
a reflector body having a body axis, the reflector body comprising
a first reflecting surface having a first axis and a first focus, the first reflecting surface having a shape such that light from the first focus is convergently reflected by first reflecting surface; and
a second reflecting surface disposed adjacent to the first reflecting surface, the second reflecting surface having a second axis a second focus, the second reflecting surface being shaped such that light from the second focus is convergently reflected by the second reflecting surface;
wherein the first and second reflecting surfaces are positioned transversally about the body axis and the second axis is non-parallel with the first axis so that light from the first focus that is convergently reflected by the first reflecting surface overlaps with light from the second focus that is convergently reflected by the second reflecting surface.

60. (New) A unit as recited in claim 59, further comprising a first light emitting diode (LED) positioned proximate the first axis and disposed to emit light generally in a direction transverse to the first axis towards the first reflecting surface, and a second LED positioned

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proximate the second axis and disposed to emit light generally in a direction transverse to the second axis towards the second reflecting surface.

61. (New) A unit as recited in claim 60, wherein the first and second LEDs are positioned approximately at the first and second foci respectively.

62. (New) A unit as recited in claim 59, wherein the first and second axes are both nonparallel to the body axis.

63. (New) A unit as recited in claim 62, wherein the first and second axes intersect the body axis at an intersection point.

64. (New) A unit as recited in claim 59, wherein the first and second reflecting surfaces each conform to surfaces of revolution about the first and second axes respectively.

65. (New) A unit as recited in claim 64, wherein the first and second surfaces of revolution are ellipsoids.

66. (New) A unit as recited in claim 65, wherein the first and second ellipsoidal surfaces have major axes of substantially the same length and minor axes of substantially the same length.

67. (New) A unit as recited in claim 59, wherein the first and second reflecting surfaces each define respective secondary foci.

68. (New) A unit as recited in claim 67, wherein the secondary foci of the first and second reflecting surfaces are approximately collocated on the body axis.

69. (New) A unit as recited in claim 59, further comprising at least a third reflecting surface disposed adjacent the first and second reflecting surfaces, the at least a third reflecting surface having a third axis and a third focus the first, second and at least a third reflecting

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surfaces being positioned transversally about the body axis, the third reflecting surface defining a third focus and being shaped such that light from the third focus is convergently reflected by the third reflecting surface.

70. (New) A unit as recited in claim 69, wherein the first, second and third axes are non-parallel to the body axis.

71. (New) A unit as recited in claim 70, wherein the first, second and third axes intersect the body axis substantially at a single intersection point.

72. (New) A unit as recited in claim 69, wherein the first, second and at least a third reflecting surface comprise at least four reflecting surfaces disposed symmetrically about the body axis.

73. (New) A unit as recited in claim 69, wherein the first, second and at least a third reflecting surfaces are aligned to illuminate a common target area corresponding to respective secondary foci of each of the first, second and at least third reflective surfaces when the first, second and third reflecting surfaces are illuminated with respective first, second and third light emitting diodes (LEDs) positioned close to the first, second and third foci of the first, second and third reflecting surfaces.

74. (New) A unit as recited in claim 69, wherein the first, second and at least a third reflecting surfaces form an enclosed shape having an aperture therethrough, the aperture lying on the body axis, and further comprising at least a fourth reflecting surface conforming to at least a fourth surface of revolution about at least a fourth revolution axis disposed to reflect light through the aperture.

75. (New) A unit as recited in claim 59, wherein the first and second reflecting surfaces each comprise a multilayer optical film.

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76. (New) A unit as recited in claim 59, wherein the first and second reflecting surfaces define reflecting surfaces for respective hollow reflectors.

77. (New) A unit as recited in claim 59, wherein the first and second reflecting surfaces define reflecting surfaces for respective solid body reflectors.

78. (New) A unit as recited in claim 59, wherein at least one of the solid body reflectors has a faceted exit surface.

79. (New) A unit as recited in claim 59, wherein at least one of the solid body reflectors has a flat exit surface.

80. (New) A unit as recited in claim 59, wherein at least one of the solid body reflectors has a curved exit surface.

81. (New) A device for producing a beam of light, comprising:
a reflective module comprising a first reflecting surface, the first reflecting surface having a first reflector axis and a first reflector focus; and
a first light emitting diode (LED) positioned approximately at the first reflector focus and directing light along a first LED axis, generally transverse to the first reflector axis, towards the first reflecting surface, light from the first LED incident on the first reflecting surface being converged by the reflective module to a target focus located outside the reflective module.

82. (New) A unit as recited in claim 81, wherein the first LED axis forms an angle to the first reflector axis of θ , where $45^\circ \leq \theta \leq 90^\circ$, where θ is the minimum angle between the first LED axis and the first reflector axis.

83. (New) A unit as recited in claim 82, wherein $60^\circ \leq \theta \leq 90^\circ$.

84. (New) A unit as recited in claim 82, wherein θ is approximately 90° .

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85. (New) A unit as recited in claim 81, wherein the first reflecting surface conforms to a first surface of revolution about the first axis.

86. (New) A unit as recited in claim 85, wherein the first reflecting surface conforms to an ellipsoid having first and second foci, the first LED having a light emitting area positioned substantially at the first focus of the ellipsoid, and the first target focus is positioned approximately at the second focus of the ellipsoid.

87. (New) A unit as recited in claim 81, wherein the reflective module comprises a transmitting medium with the reflecting surface disposed outside the transmitting medium, the transmitting medium being positioned between the first LED and the reflecting surface.

88. (New) A unit as recited in claim 87, wherein light from the first LED exits the reflective module through a first exit aperture and the transmitting medium has a substantially flat surface at the first exit aperture.

89. (New) A unit as recited in claim 87, wherein light from the first LED exits the reflective module through a first exit aperture and the transmitting medium has a faceted surface at the first exit aperture.

90. (New) A unit as recited in claim 87, wherein light from the first LED exits the reflective module through a first exit aperture and the transmitting medium has a curved surface at the first exit aperture.

91. (New) A unit as recited in claim 87, wherein the transmitting medium has a concave surface forming a concavity for receiving the first LED, at least part of a lens of the first LED being located in the concavity.

92. (New) A unit as recited in claim 81, wherein the first reflector is formed with the reflecting surface disposed between the first LED unit and a reflector support medium.

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93. (New) A unit as recited in claim 81, wherein the reflective module further comprises at least a second reflecting surface having a second reflector axis and a second reflector focus, a second LED being positioned approximately at the second reflector focus and directing light towards the second reflecting surface.

94. (New) A unit as recited in claim 93, wherein light from the second LED incident on the second reflecting surface is converged to the target focus.

95. (New) A unit as recited in claim 94, wherein the light from the second LED is reflectingly converged to the target focus by the second reflecting surface.

96. (New) A unit as recited in claim 93, wherein the first and second reflector axes are non-parallel.

97. (New) A unit as recited in claim 96, wherein the first and second reflector axes approximately intersect at the first target focus.